



Projecting Inundation Due to Sea Level Rise in the San Francisco Bay and Delta

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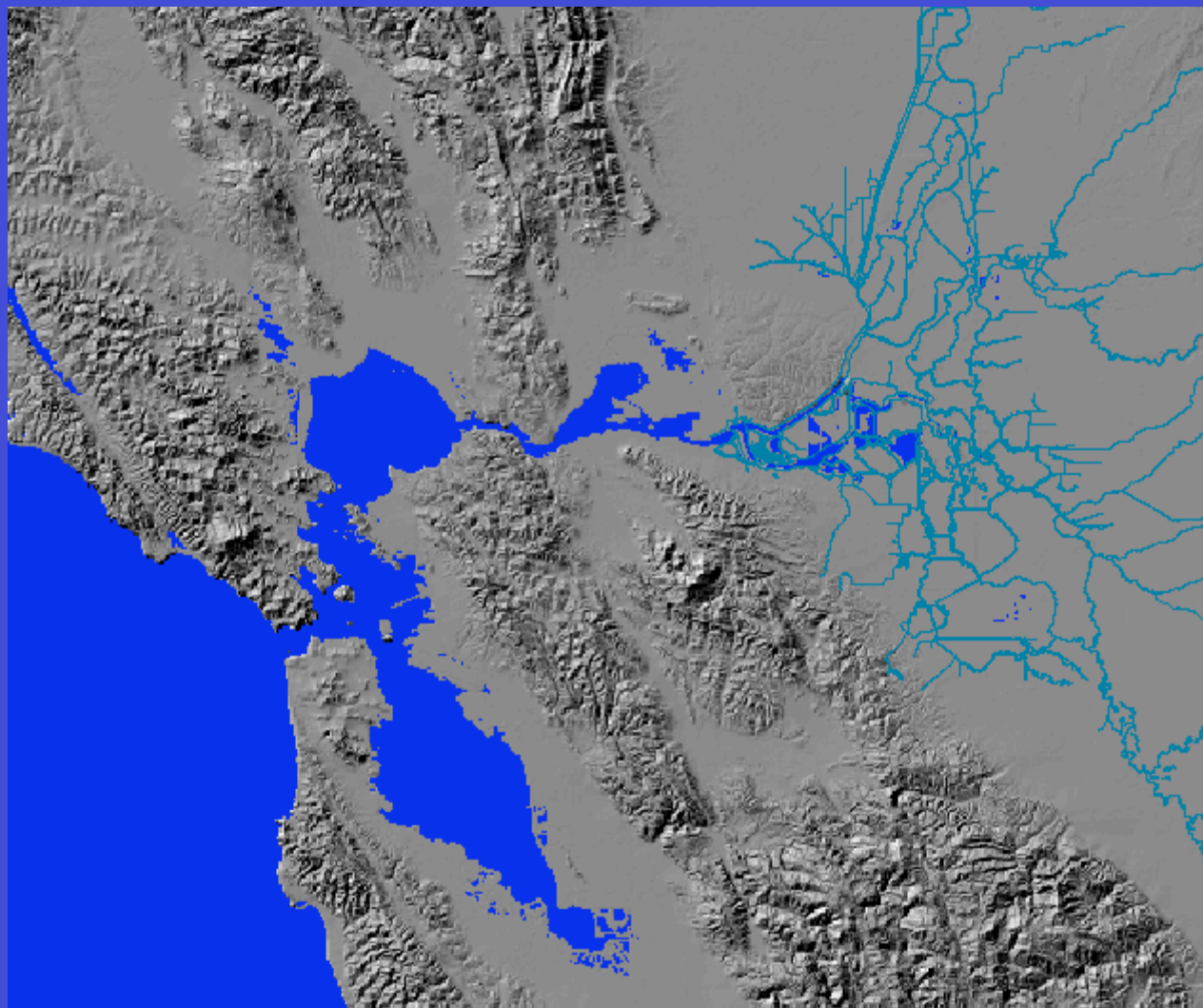
Projected sea level rise of 20-80 cm over the next century will affect the shoreline of the Bay/Delta and increase the risk of levee failures.

Estimates of newly inundated areas are necessary to assess potential changes in shallow water habitat, contaminant cycling, sediment dynamics, etc.

The ultimate goal is to provide a climate context for researchers in other disciplines working in the estuary, as well as for restoration efforts, policymakers, etc.

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National Elevation Dataset used in this study

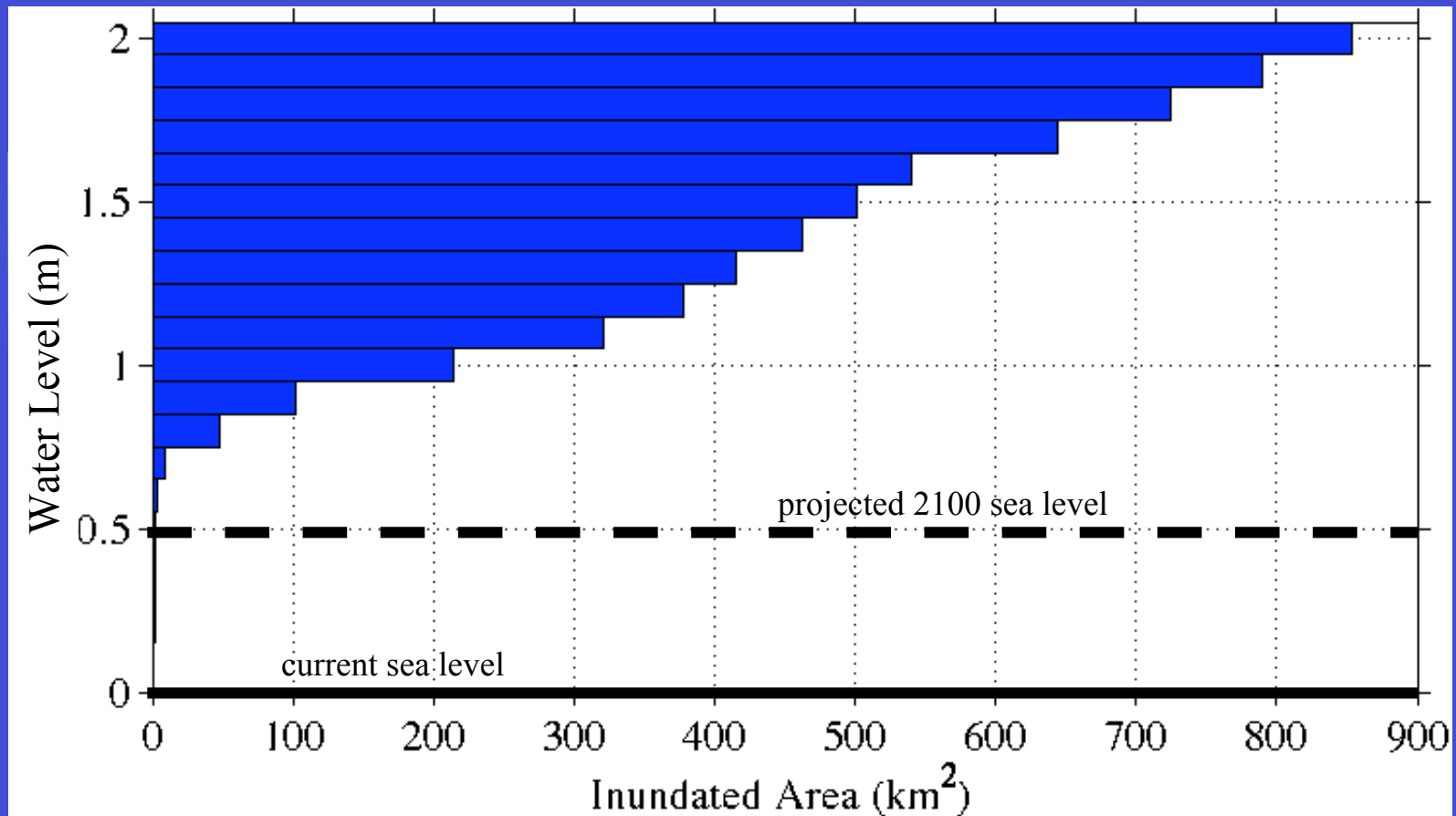


~9m horizontal
resolution

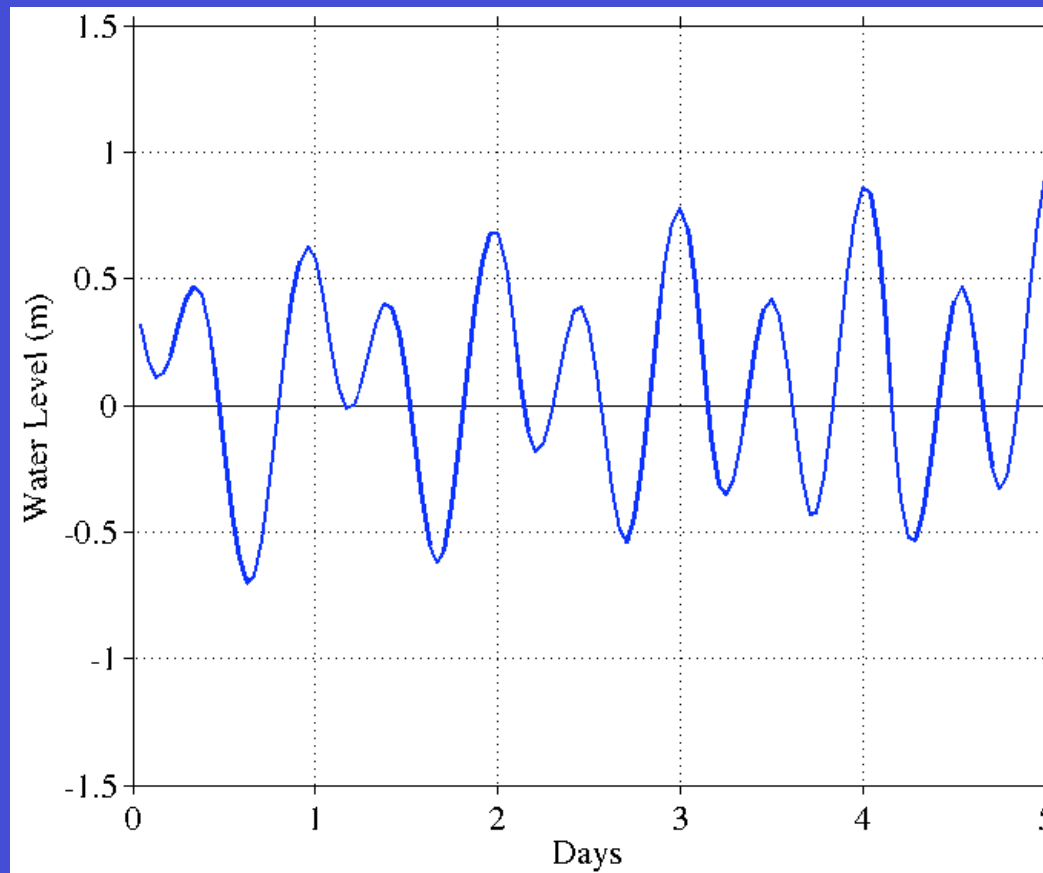
NED data are available from seamless.usgs.gov

Inundated area versus water level

Even with 50 cm sea level rise, relatively little new area is permanently inundated.

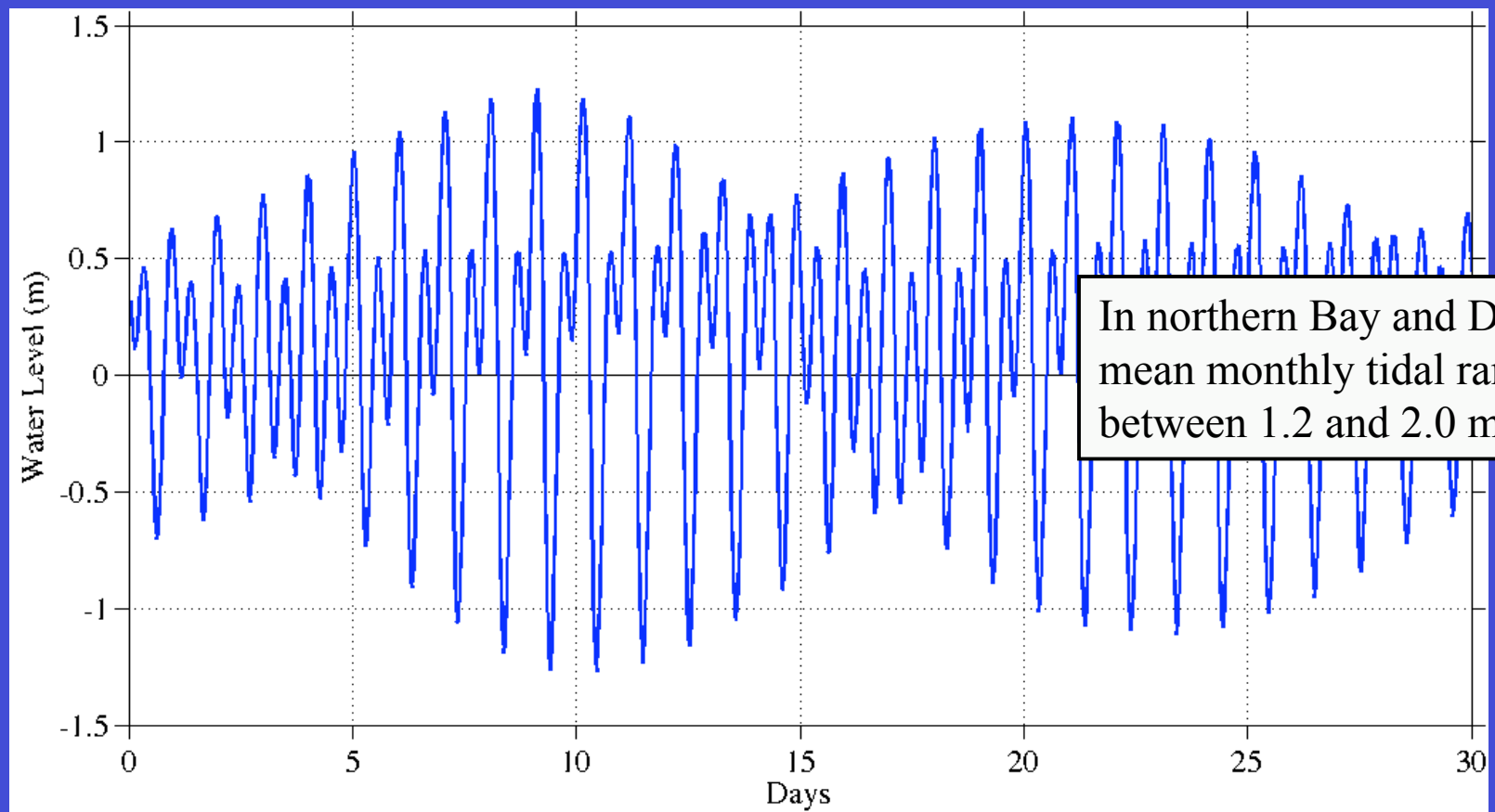


Tides vary around mean sea level on daily time scales...



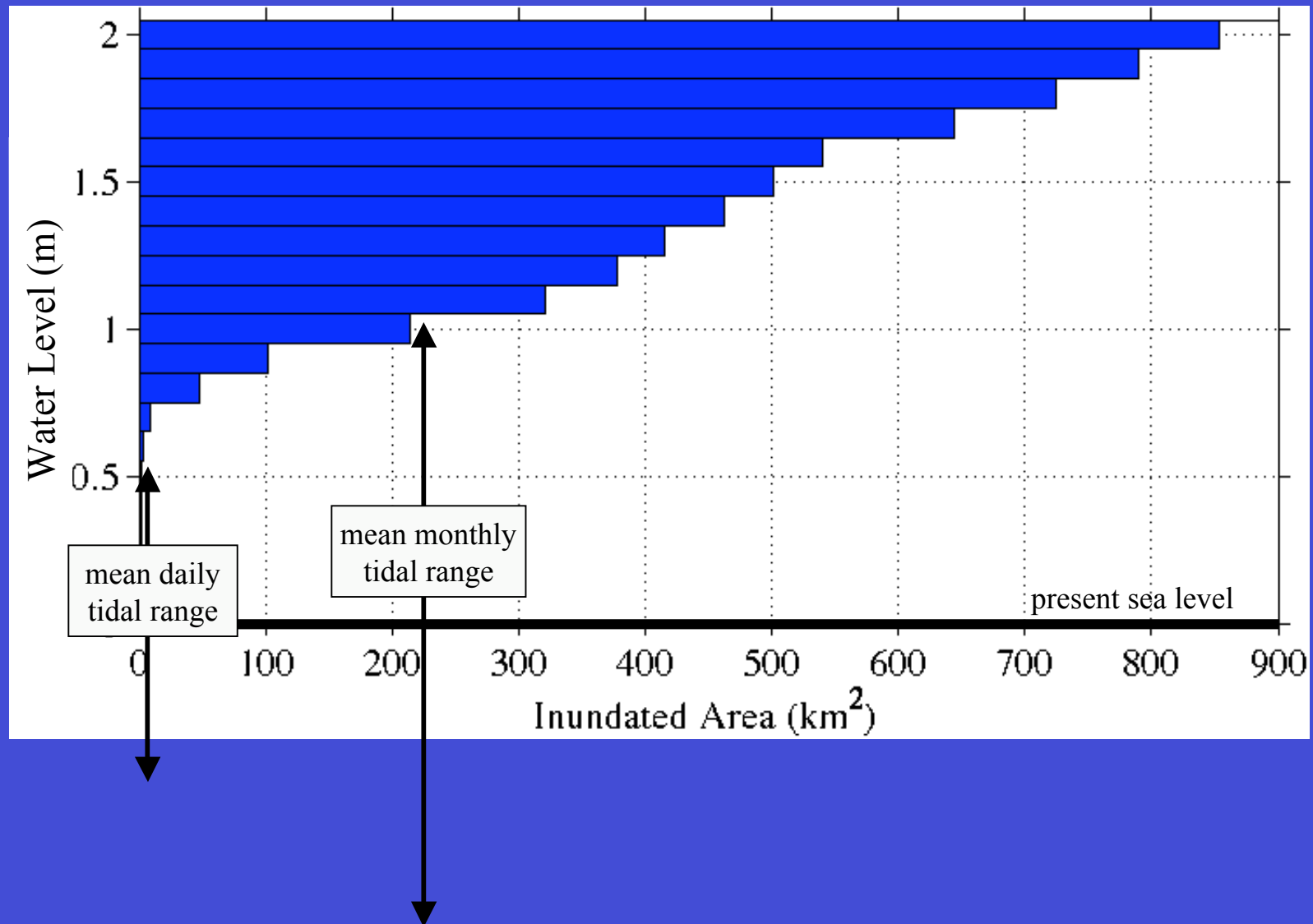
In northern Bay and Delta, mean daily tidal range is between 0.8 and 1.0 meter.

...and also on monthly time scales.

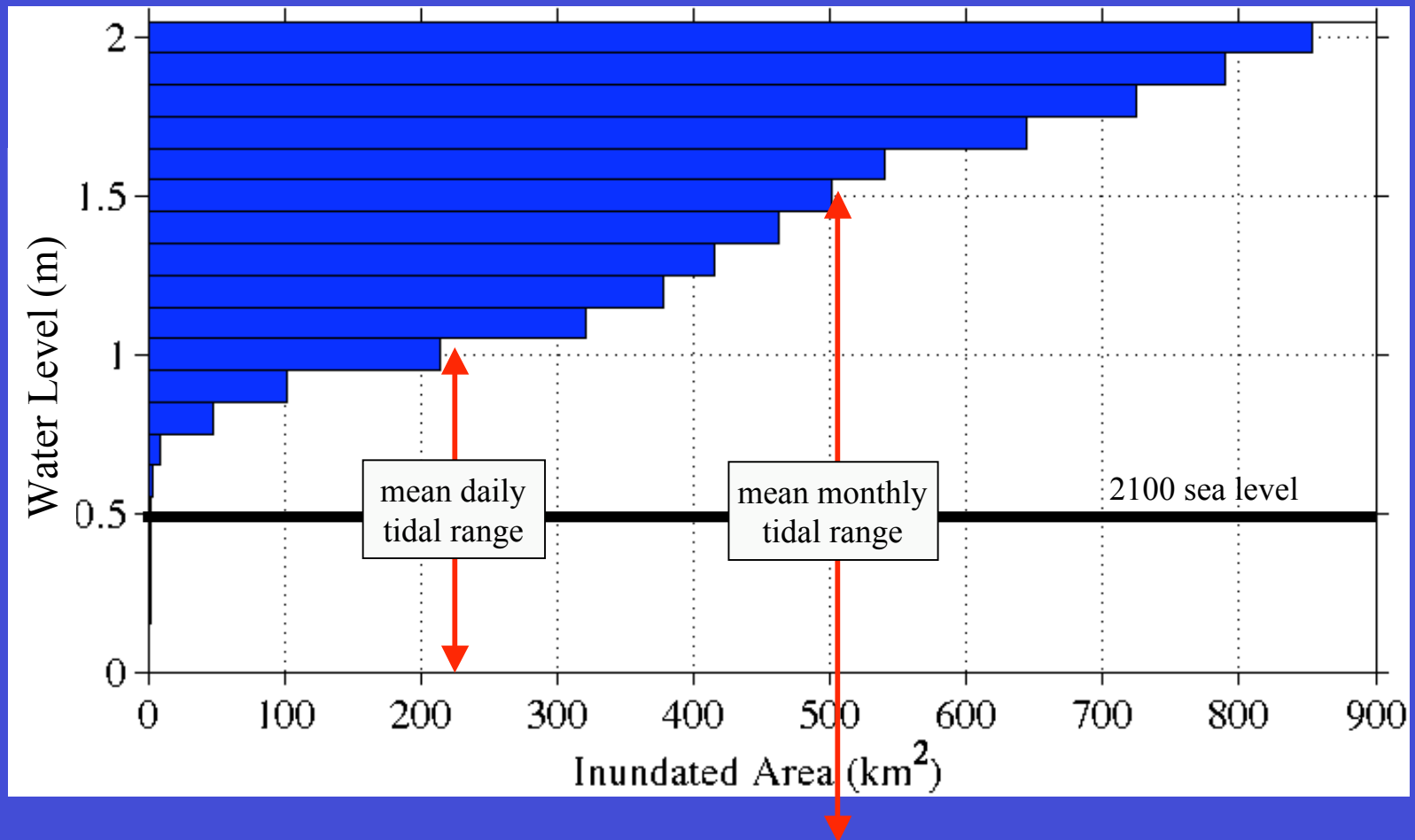


Tides cause periodic inundation.

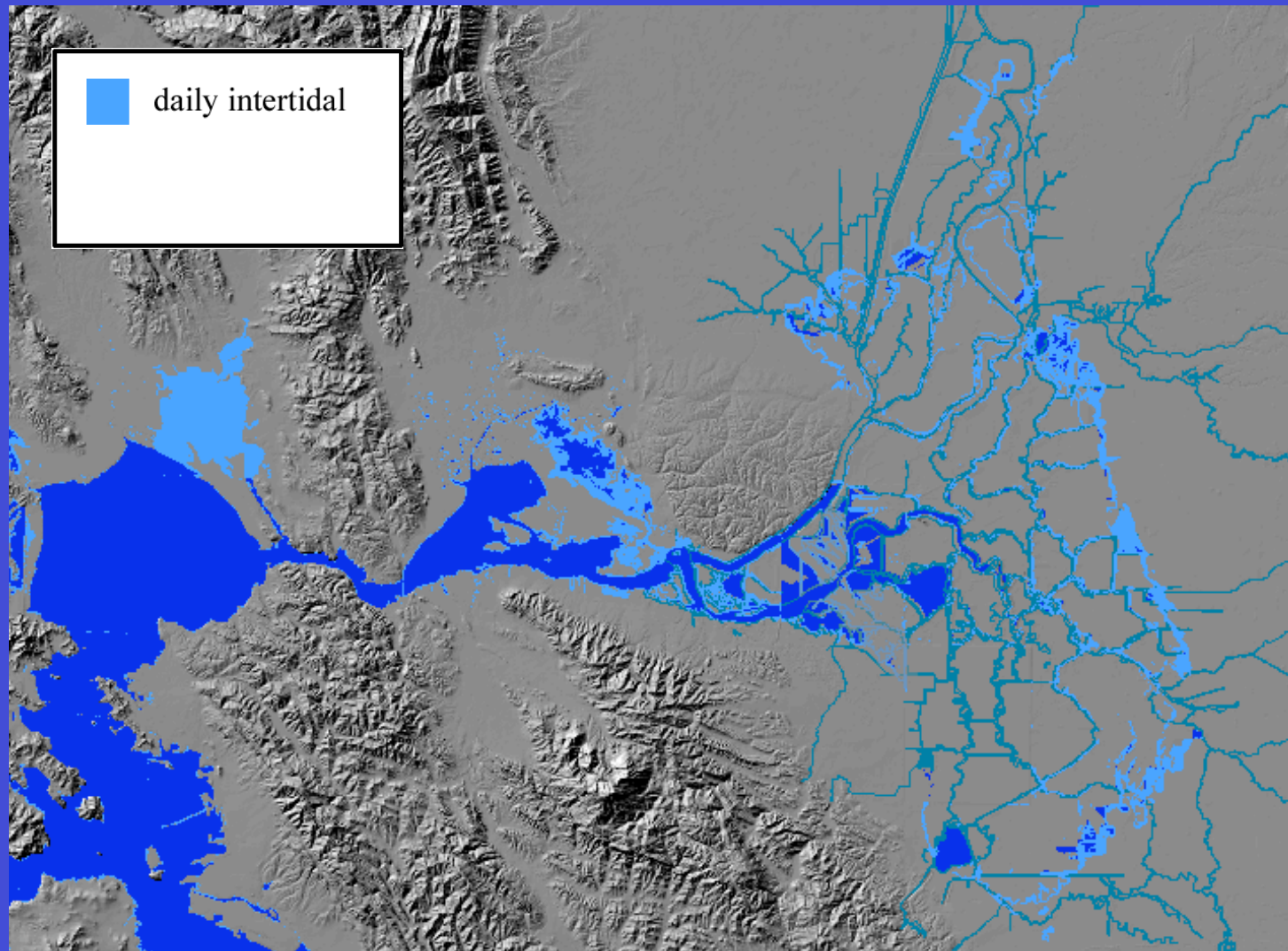
Present-day monthly intertidal area is $\sim 210 \text{ km}^2$



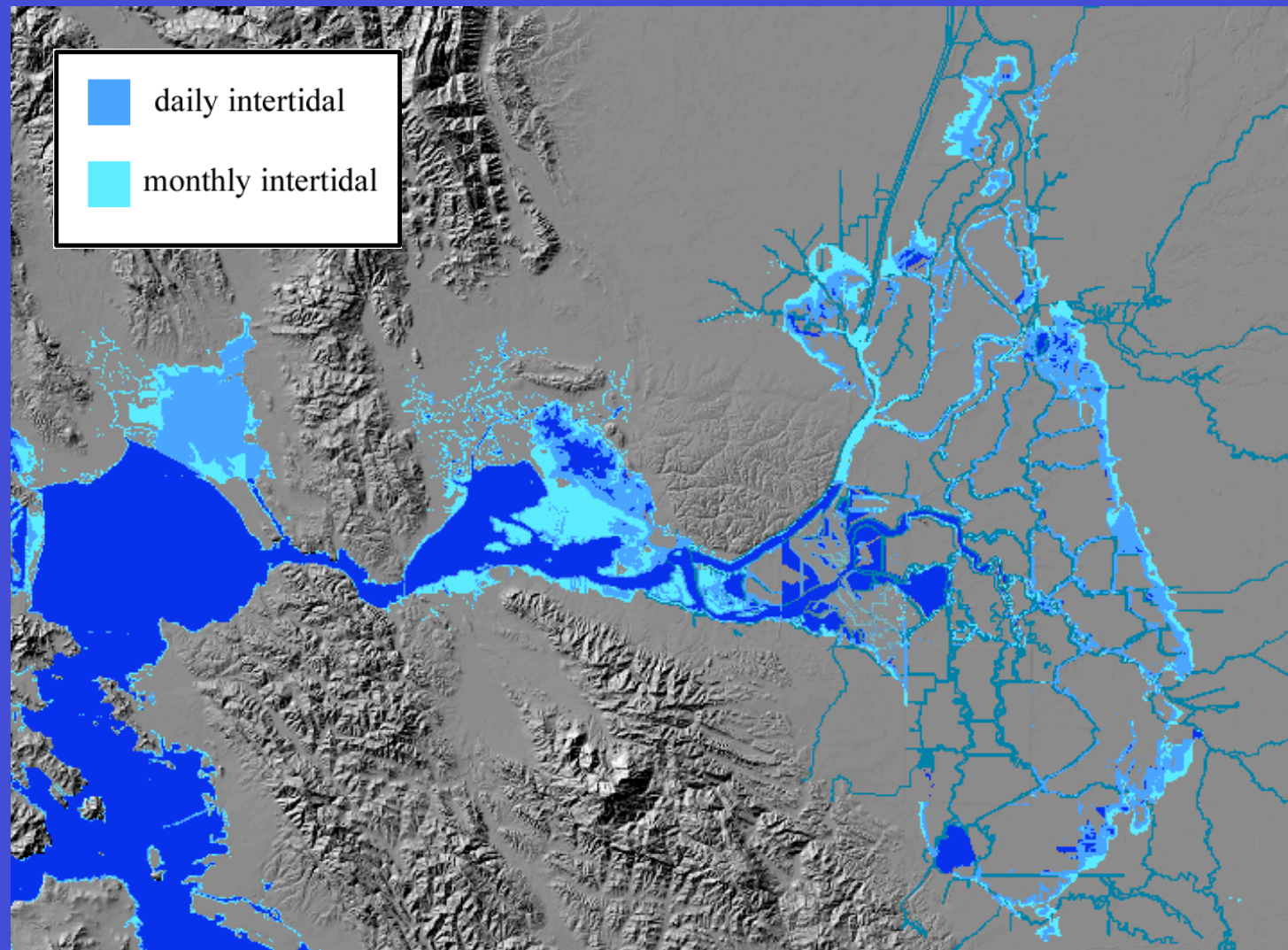
Projected 2100 intertidal area



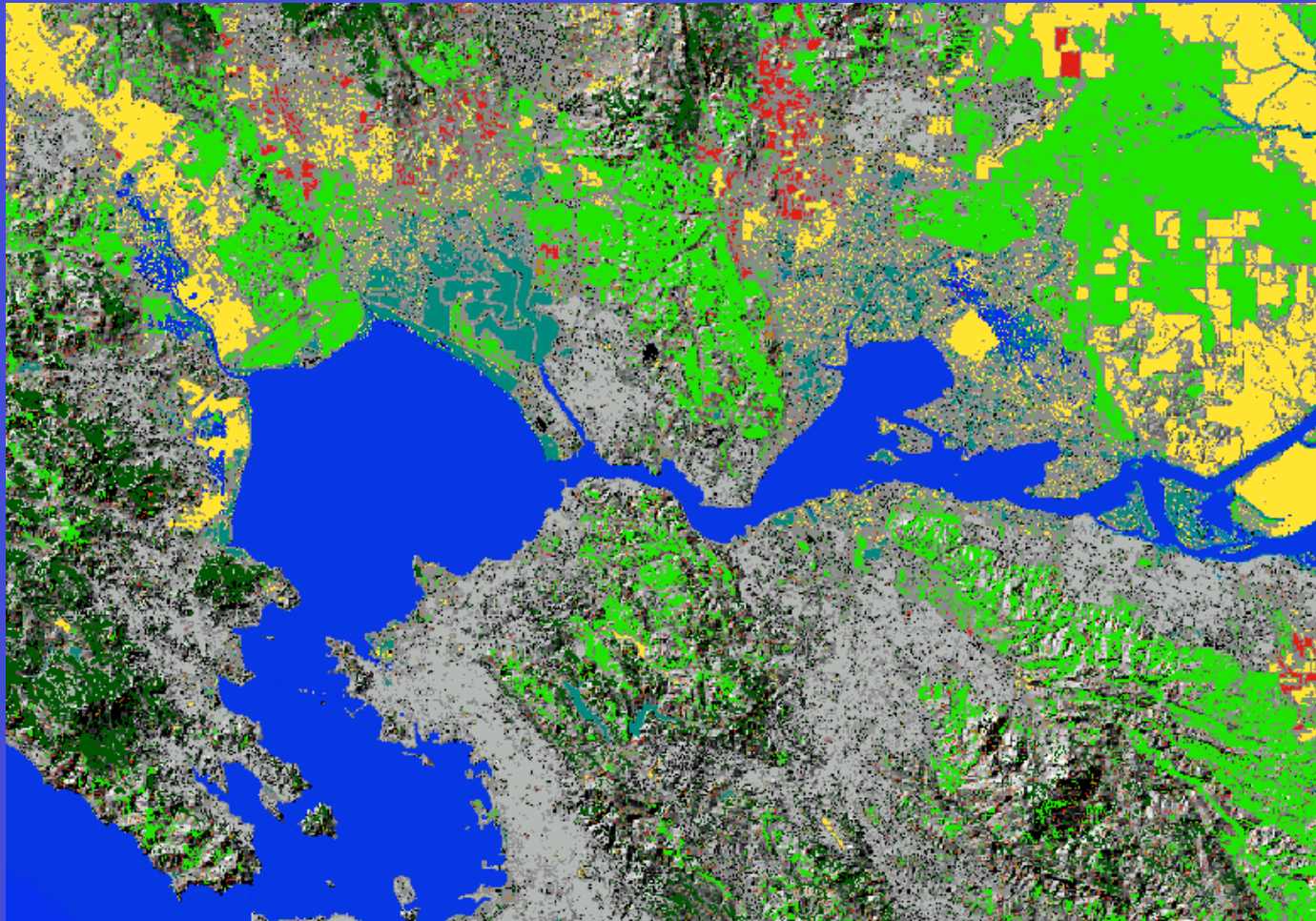
Projected intertidal areas in 2100



Projected intertidal areas in 2100

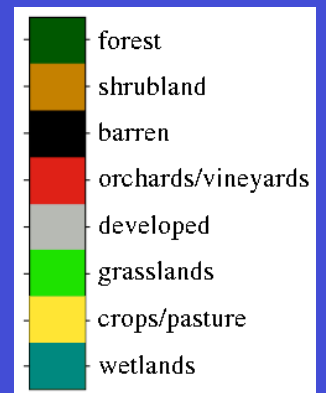


National Land Cover Dataset used to break down results by land cover type



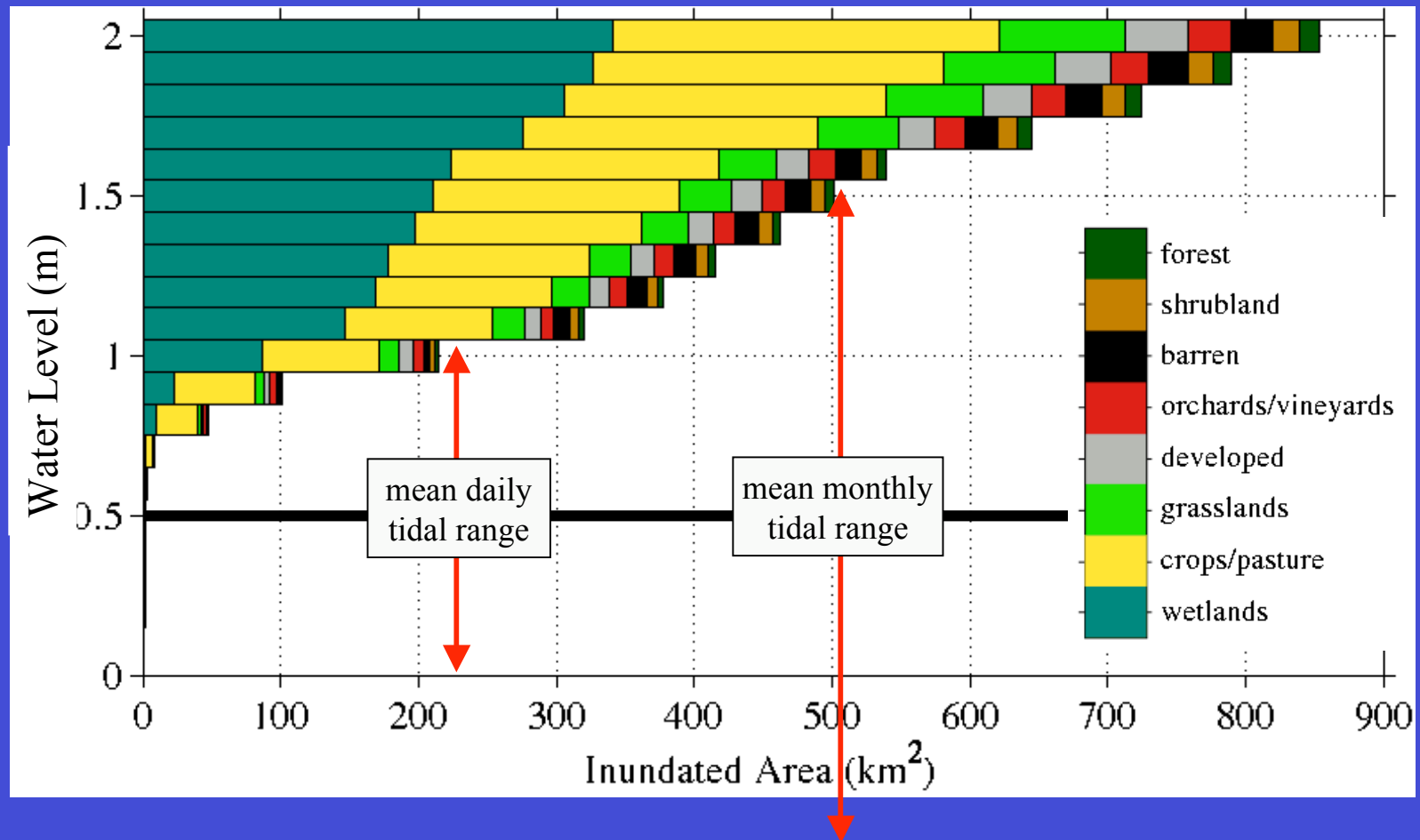
30-m resolution
21 categories

Here, reduced to
eight categories:

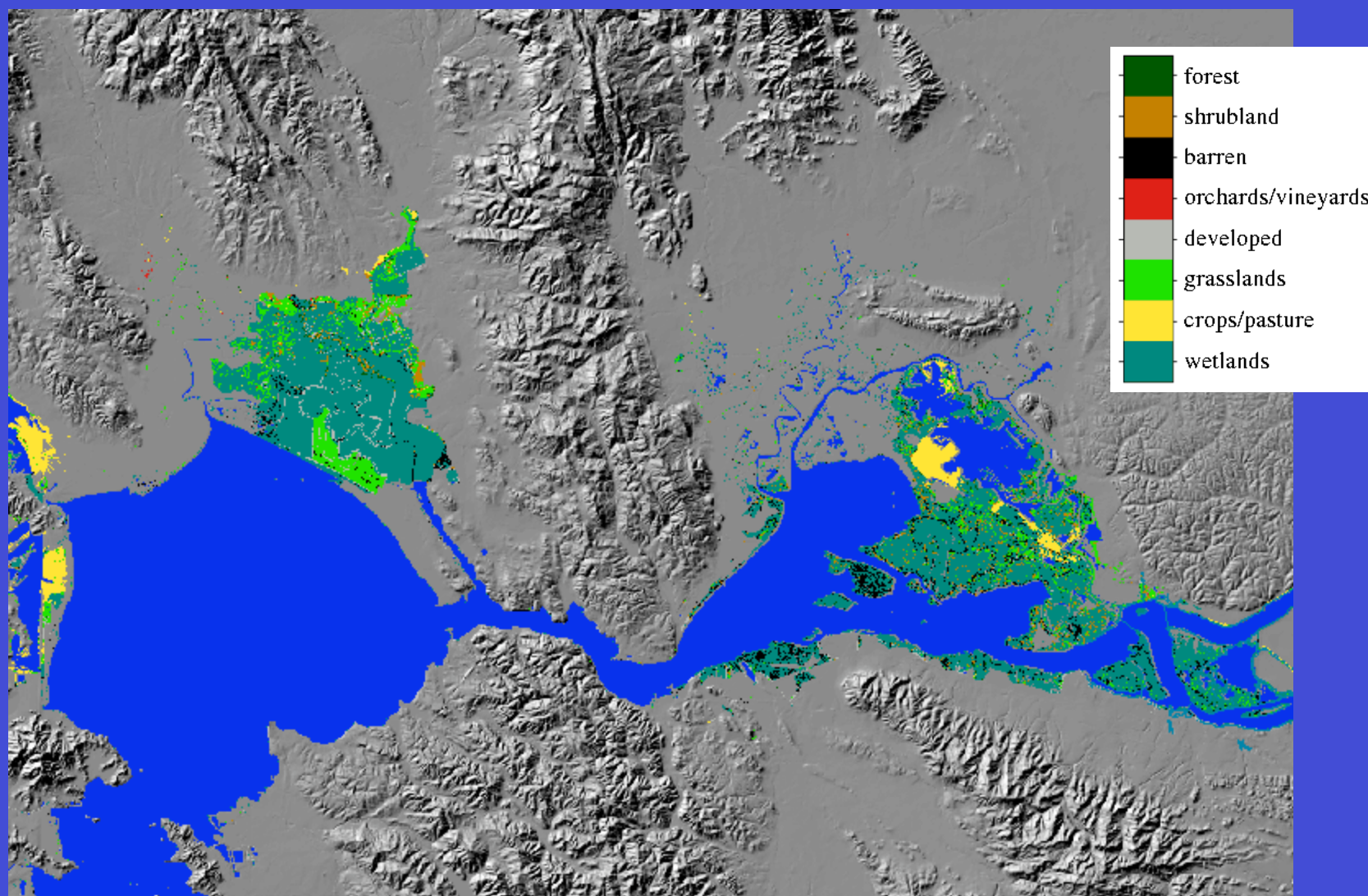


NLCD is available from seamless.usgs.gov. 1992 version used here.

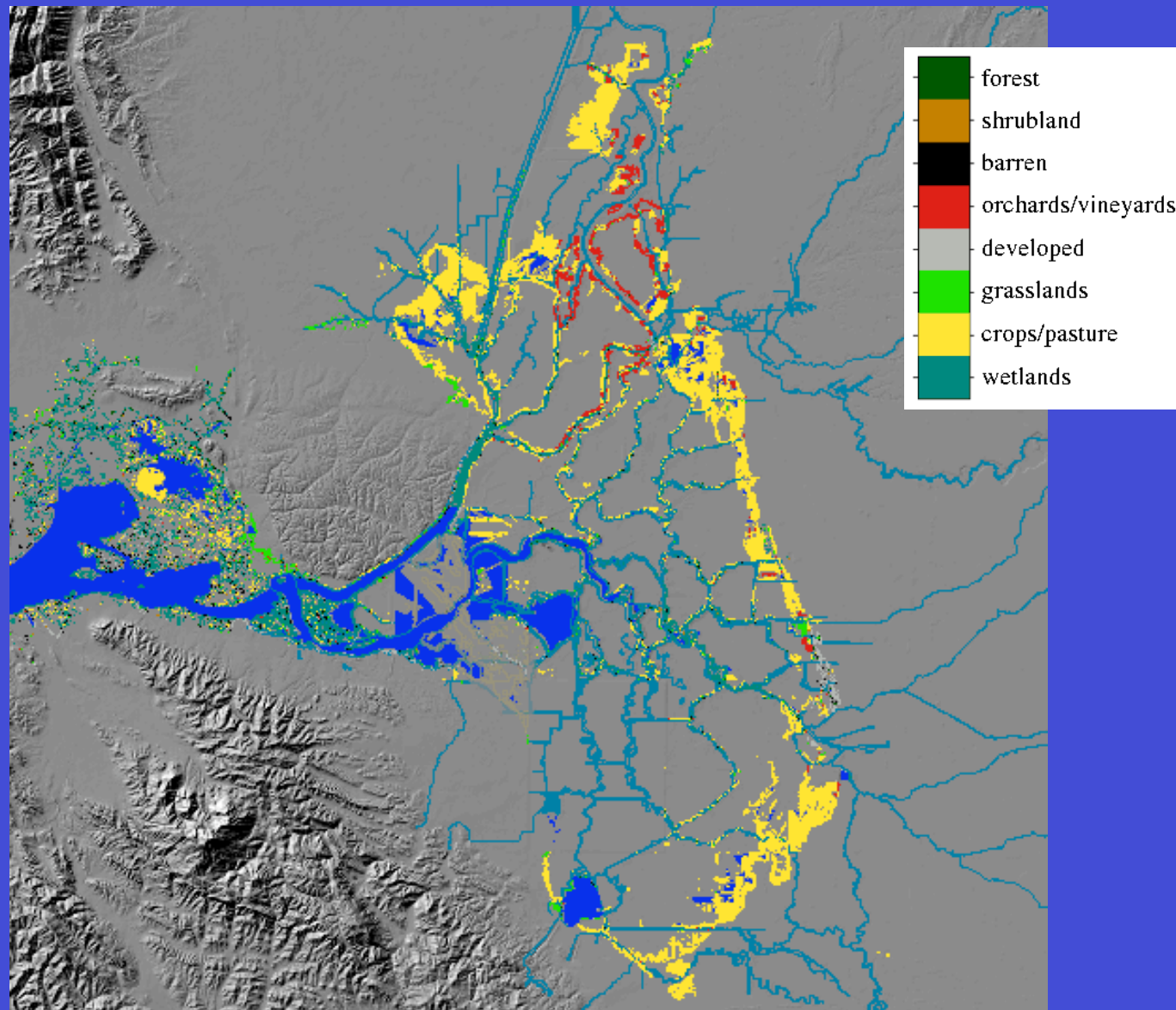
Wetlands and Crops/Pasture are top two inundated categories in 2100



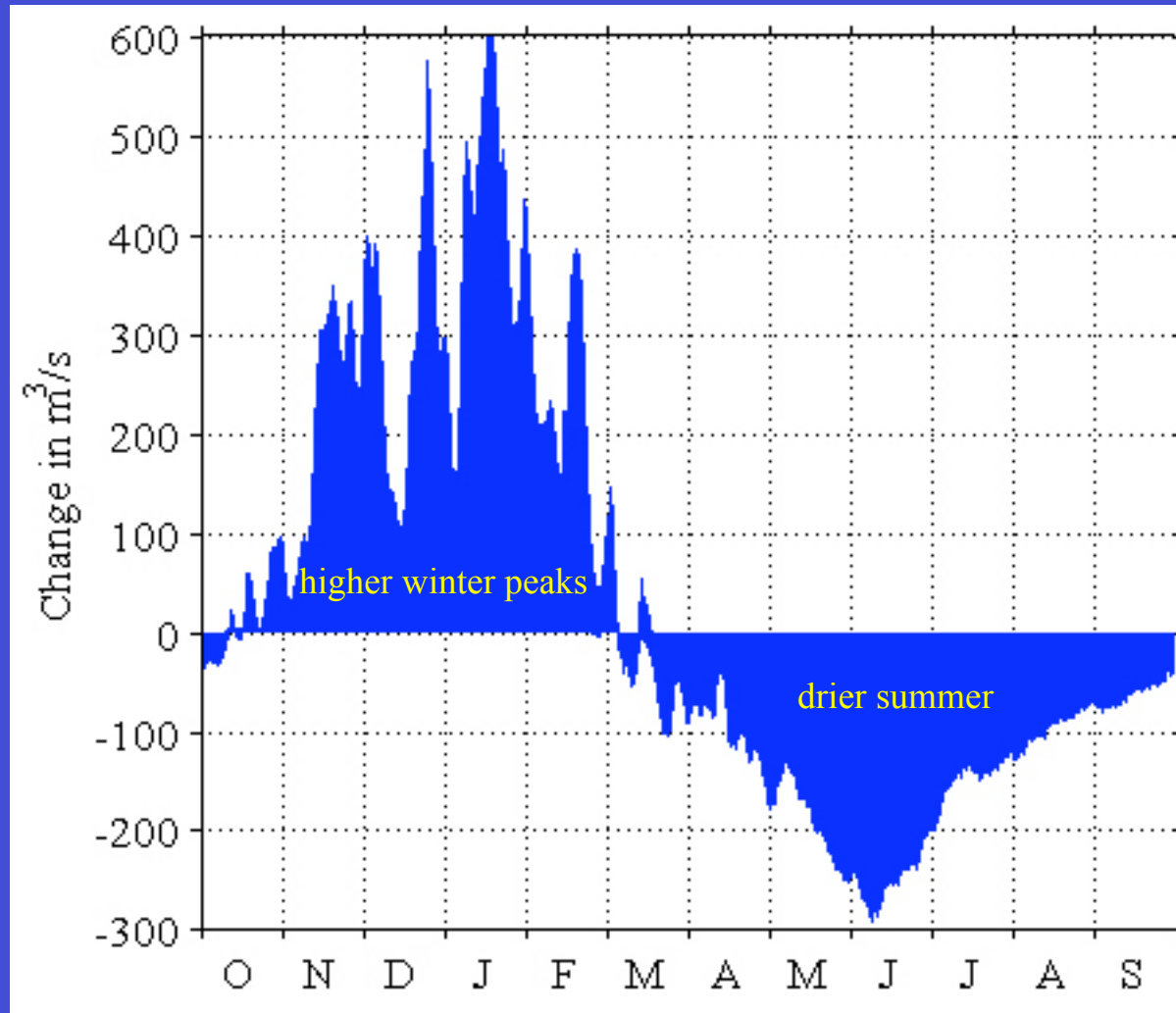
Inundated wetlands: Napa and Suisun



Inundated croplands in Delta periphery

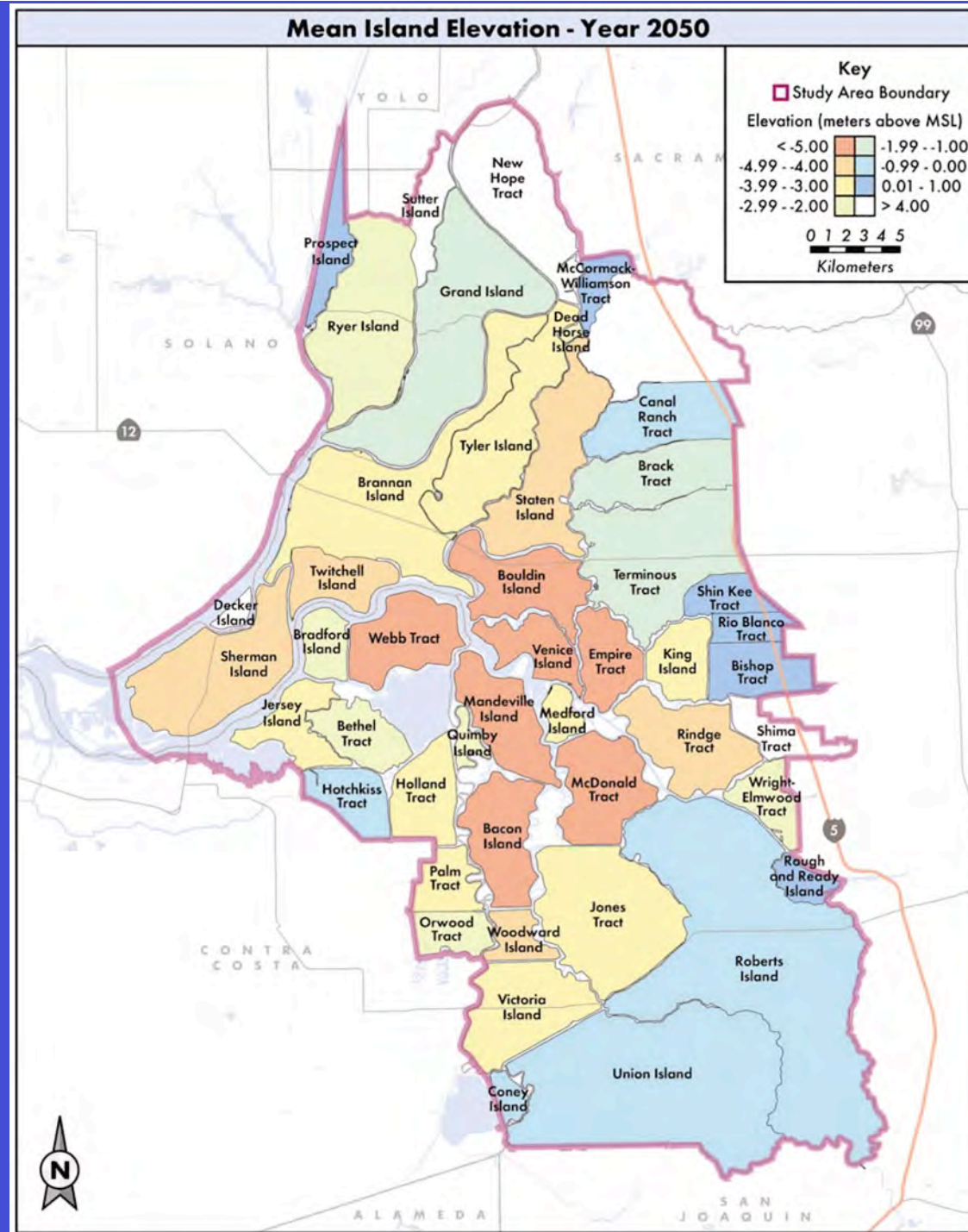


Estimated change in Delta flow by 2060 (relative to present day)



(results reflect no change in management practices)

Elephant in the room...



Conclusions

- Most potentially inundated areas are intertidal.
- Areas at risk of new inundation are mainly around existing wetlands and in the Delta periphery (farmland, for the moment).
- Sea level rise, combined with higher winter flows, would increase risk of levee failure in the inner Delta and the outer Delta.

Next Steps

- Finish photogrammetric elevation dataset; compare with LIDAR as available.
- Map projected intertidal areas more accurately.
- Update to NLCD 2001 land cover data.
- Include bathymetry and calculate changes in tidal prism.
- Eventually, estimate potential changes in flood stage, combine with other sea level effects (storm surge, El Nino) to project new exceedance curves in the Delta.